

## Carolina Red-backed Vole

*Myodes gapperi* formerly *Clethrionomys gapperi carolinensis*

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### DESCRIPTION

#### Taxonomy and Basic Description

The red-backed vole was first described by Vigors in 1830 and is readily distinguished from the other voles in South Carolina by the presence of a reddish dorsal pelage, with grayish sides and a silvery white to pale yellow underside pelage. The reddish color is usually present as a broad band running from the forehead to the rump. The tail is bi-colored. The ears are relatively prominent and extend above the fur. Young voles are gray until their post-juvenile molt, which occurs at approximately 30 days of age. There is no sexual dimorphism. Adult length is 116 to 172 mm (4.57 to 6.77 inches) with a tail length of 30 to 50 mm (1.18 to 1.98 inches). Adult weight varies from 14 to 42 g (0.49 to 1.48 ounces). In general, the animals from the Appalachians are larger than their northern counterparts (Whitaker and Hamilton 1998).



The subspecies of red-backed vole that occurs in South Carolina is the Carolina red-backed vole, *Clethrionomys gapperi carolinensis*. The separation line between *C.g. carolinensis* and *Clethrionomys gapperi gapperi* is farther to the north in Virginia and West Virginia is not well understood (Whitaker and Hamilton 1998).

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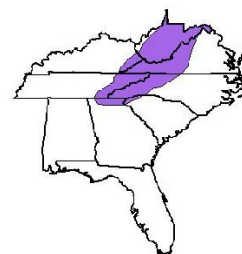
#### Status

This species is tracked by the South Carolina Department of Natural Resources (SCDNR) Heritage Trust database and is of special concern in South Carolina. The state rank for the red-backed vole is S2/S3, which indicates it is rare; the factor that makes the species vulnerable is the limitation of suitable habitat within South Carolina. This species has a global rank of secure (G5) (NatureServe 2004). The red-backed vole is apparently secure in West Virginia, Tennessee and North Carolina (NatureServe 2004). Georgia and Kentucky have designated it as vulnerable. Southern red-backed voles are included on the IUCN Red List as a species at “Lower Risk, Least Concern.” (Cook and Kirkland, Jr. 1998).

#### POPULATION SIZE AND DISTRIBUTION

The southern red-backed vole is distributed throughout Canada and the northern tier of states in the US. The range of this species extends south in the Appalachian Mountains to northern Georgia (Wharton and White 1967).

Carolina Red-backed Vole Distribution



There are no population estimates available in the southern Appalachian Mountains, which represent the southern end of the red-backed vole's range. Trapping records from collections in Highlands, North Carolina and the Smoky Mountains National Park indicate that this species can attain high densities and maintain viable populations in suitable habitats (Pivorun, pers. obs.). In addition, the population was observed to cycle over five to eight year intervals in the Highlands, North Carolina National Forest lands (Pivorun, pers. obs.); six to ten year cycles have been observed in other localities (Patric 1962). There is such a paucity of trapping records from South Carolina that no data are available on population cycles. This species was one of the most abundant mammals on the summit of Mt. Rogers in western Virginia (Linzey 1998). High-density populations are usually located at altitudes above 610 to 915 m (2,000 to 3,000 feet). The majority of suitable habitat in South Carolina is located at lower altitudes and one would expect smaller population numbers in this state. The presence of voles in South Carolina may also be dependent upon movements of voles from higher altitudes in North Carolina that occur when population cycles result in high densities in the North Carolina mountains.

The red-backed vole is restricted to the higher elevation habitats of South Carolina within the southern Appalachians ecoregion. Currently the only published records for this species are from Oconee (Pivorun et al. 1984) and Pickens Counties (Laerm et al. 1995). Suitable habitat for the Carolina red-backed vole is present in Greenville County. Current population studies are not being conducted on the distribution and abundance of this species in South Carolina.

Predators of red-backed voles include snakes, owls, foxes, bobcats and weasels. Presumably, coyotes will use these as a food source. Although these voles are prey of several species, survival of the red-backed vole population is usually not threatened by these predators.

## HABITAT AND NATURAL COMMUNITY REQUIREMENTS

The red-backed vole is found in the southern Appalachians ecoregion. Within that ecoregion, the vole can be found in habitat with mesic mixed forests, mesic deciduous hardwood, and high altitude coniferous forests and beech gaps. A mesic environment with an abundance of litter, rotting logs, moss covered rocks, exposed roots and rock crevices would be considered an ideal habitat. Generally, the presence of a bog area or streambed at altitudes above 762 m (2,500 feet) offers an appropriate habitat (Webster et al. 1985). Neither forest age, nor successional stage, has been reported as critical factors in determining habitat preference. Red-backed voles do not colonize post burn communities as readily as other species (Merritt and Zegler 1991) but will inhabit clear cuts (Kirkland 1990; Schloyer 1977; Martell 1983; Monthey and Soutiere 1985).

In South Carolina, red backed voles are only found in Oconee and Pickens County at altitudes above 915 m (3,000 feet) in mixed deciduous forests associated with boggy and stream bed habitats that contain rhododendron. In the Southern Appalachians, associated species include the woodland jumping mouse (*Napaeozapus insignis*), star-nosed mole (*Condylura cristata*), the hairy-tailed mole (*Parascalops breweri*) and masked shrew (*Sorex cinereus*) (Watts 1970).

The red-backed vole utilizes underground tunnels of other species such as shrews and moles for den and nest sites; they also use crevices among exposed roots and rocks for these purposes.

These voles forage along the ground and around downed trees. There is very little known about the use of subterranean fungi by this species, even though this is considered a primary food source (Fisher 1968).

## CHALLENGES

In South Carolina, a large portion of the habitat in the Blue Ridge ecoregion that is appropriate for red-backed voles is on public land, including National Forests, State Parks and SCDNR managed properties. Additionally, some lands that contain red-backed vole habitat are owned or held in easement by various land trusts. None of these properties were purchased specifically to protect the red-backed vole; however, the species benefits from acquisition and protection of its habitat. While these protected areas provide needed habitat, populations on private lands are still impacted by land conversion.

Land development in the southern Appalachians represents a major challenge to the red-backed vole. Land use in this region is rapidly changing from rural/agricultural to urban. An unpublished study conducted by SCDNR showed a 4-fold increase in development to every one-fold increase in population between 1983 and 1998 (Richard Lacy, pers. comm.). As these conversions occur, habitat for this species is being lost. Even when development proceeds in close proximity to existing red-backed vole habitat, the species may be adversely affected as these animals require relatively undisturbed habitats. Additionally, the changes in hydrology that result from urbanization will affect habitat for this species. Red-backed voles require wet areas, like bogs; these areas are expected to diminish as development continues.

## CONSERVATION ACCOMPLISHMENTS

Terrestrial small mammal surveys that have been conducted in the South Carolina mountains have provided data to better understand habitat requirements and population dynamics of the various rodent and insectivore species. These studies were possible as a result of partnerships between several interested parties including the University of Georgia, the US Forest Service, Clemson University and SCDNR.

## CONSERVATION RECOMMENDATIONS

- Discourage major developments in known red-backed vole habitat in the Blue Ridge ecoregion
- Complete ecoregion-wide surveys for red-backed vole distribution and density. Surveys and survey techniques should be standardized throughout the southeast so that results and data are readily comparable. All capture data should be made available to the statewide Heritage Trust database as well as shared with neighboring states.
- Concurrent with surveys, resolve the subspecies designation for red-backed voles (*C. c. carolinensis*) and distribution using molecular data and intensive morphometric analysis. This will require cooperation or partnerships with neighboring states.
- Provide information on the ecological role and benefits of red-backed voles. This species is not considered a nuisance species. This information would allow for better management of private, state and federal lands in the montane regions of the state;

management would be partially based on consideration of the impact on mammalian species that are major prey items for predators such as fox, bobcat and birds of prey.

## MEASURES OF SUCCESS

As research and management needs are identified, projects should be proposed and prioritized by those with the greatest conservation applicability. Surveys and density estimates in the southern region should provide some population estimations, which will be used to more accurately rank the species and prioritize future management needs.

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